U. S. FOREST SERVICE

RESEARCH NOTE LS-41

AKE STATES FOREST EXPERIMENT STATION • U. S. DEPARTMENT OF AGRICULTURE

Sugar Maple Veneer Logs Should be Graded for Pith Flecks[1]

Pith flecks are abnormal wood features caused by the feeding of Agromyzid (Diptera) fly larvae on the cambial tissues of growing trees. In the northern Lake States forests pith flecks are most frequently found in certain diffuse porous tree species such as maple, birch, aspen, willow, cherry, and basswood. All larvae found mining the living cambium of these trees appear to belong to the genus *Phytobia,* but the individual species have not been identified.

Pith flecks on face veneers of sugar maple, *Acer saccharum* Marsh., are often considered a defect (worm crawl) and substantially reduce veneer value, but the present veneer log grading rules do not recognize pith flecks as defects. The purpose of this paper is to show the degrading effect of pith flecks on veneer values in order to illustrate the need for recognizing pith flecks in sugar maple veneer log grading.

On sugar maple log ends, pith flecks are normally light-colored (fig. 1, *A*), but on the tangential (fig. 1, *B*) and radial (fig. 1, *C*) surfaces the same pith flecks show as brown streaks. When the brown streaks are numerous or cross the grain, matched and uniform grade face veneers are degraded.

It seemed likely that the greater the number of pith flecks on log ends, the greater the losses in veneer values. To test this, seven 8½-foot sugar maple butt logs with varying intensities of pith fleck were selected for a mill study.

All seven logs were graded as No. 1 (Veneer Grade),[2] and were from second-growth trees ranging between 13.5 and 14.1 inches in diameter at breast height. Minimum small-end diameter was 12 inches inside bark with less than a 6-inch central core in heart or mineral stain. The central nonusable core, 6½ inches in diameter, was determined by the size of the lathe chuck, and any pith flecks in this core did not appear in the veneer yields. No log-end defects other than pith fleck and the heart center were allowed. All logs were straight and contained no defect indicators on the bark surface.

Pith-fleck intensity for each log was determined by counting flecks on the usable perimeter of both log ends and calculating the number of pith flecks per square foot of end area (fig. 2).

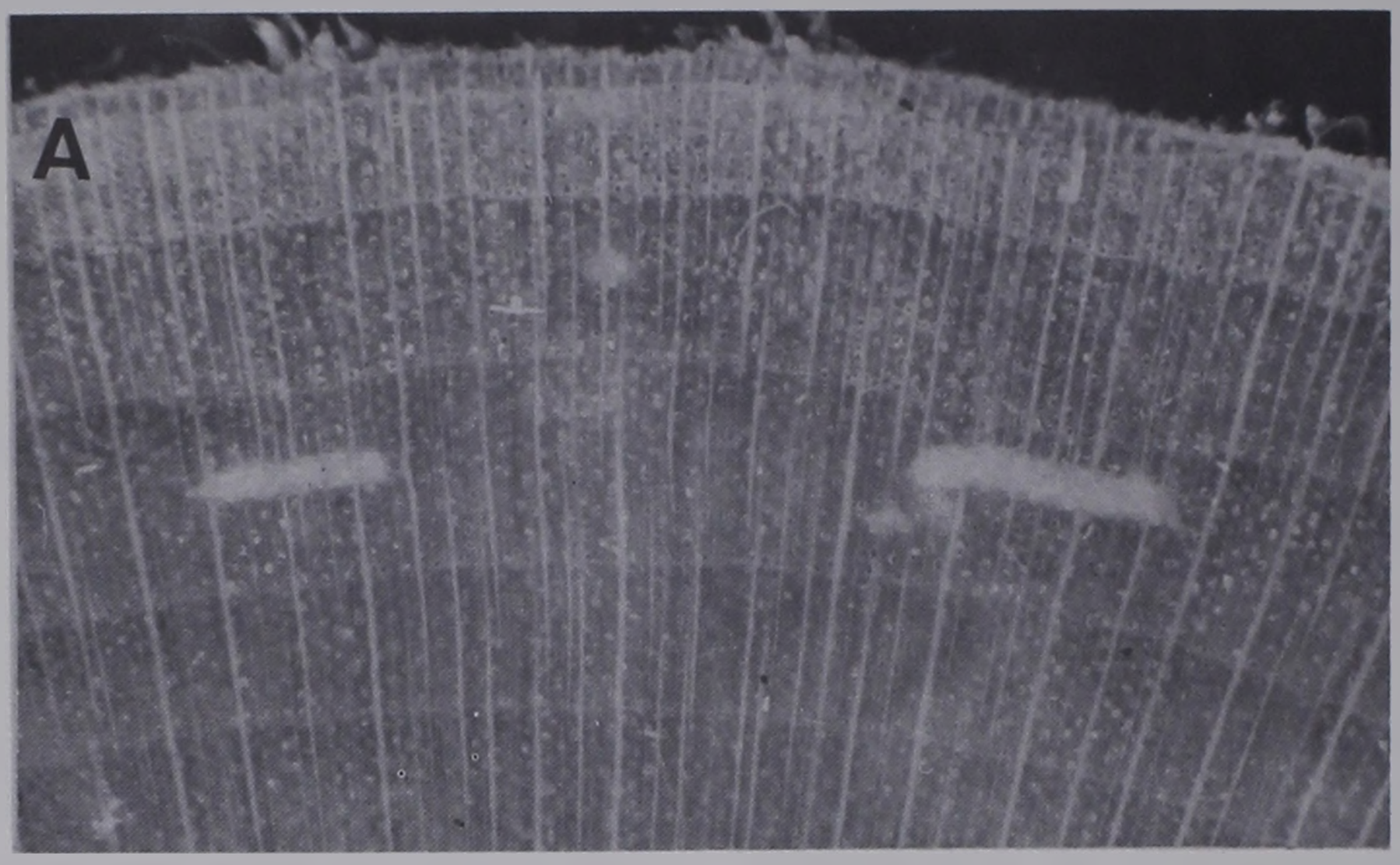
The logs were cut into 4-foot bolts for turning, debarked, and cut into 1/16-inch-thick veneer on a rotary lathe. The green veneer was clipped to uniform sizes, dried, and clipped again. Veneer yields were determined according to the grades currently being used by the study mill during commercial production (fig. 3):

Grade	*Specification*
White	Clear, except admits traces of light pith fleck
Unselect white	Clear, except admits maximum of two 3-inch pith flecks along grain in 6-inch square
Unselect	Admits all pith fleck, spots, and streaks and mineral spots and streaks
Center	Admits small, sound knots, pinholes, checks, rough grain, mineral, and heartwood
Random widths	Sound cuttings of three top grades in sizes not fitting current cutting orders
Golf	Sound cuttings in three sizes: 9 by 11 inches, 9 by 16 inches, 9 by 21 inches. These pieces are used in the manufacture of laminated golf club heads

For comparative purposes, veneer values were calculated in two ways. First the actual value with pith flecks present was computed. Second, the value that could have been obtained if cambium miners had not invaded the tree was computed. This second calculation meant that all pieces of unselect white veneer and certain pieces of unselect veneer were upgraded to the white grade and were re-evaluated according to the current

[1] *The cooperation of Mr. Henry Bannack, Frost Veneer Company, Antigo, Wis., is gratefully acknowledged.*

[2] *Northern Hemlock and Hardwood Manufacturers Association. Official grading rules for northern hardwood and softwood logs and tie cuts. 12 pp. 1959.*



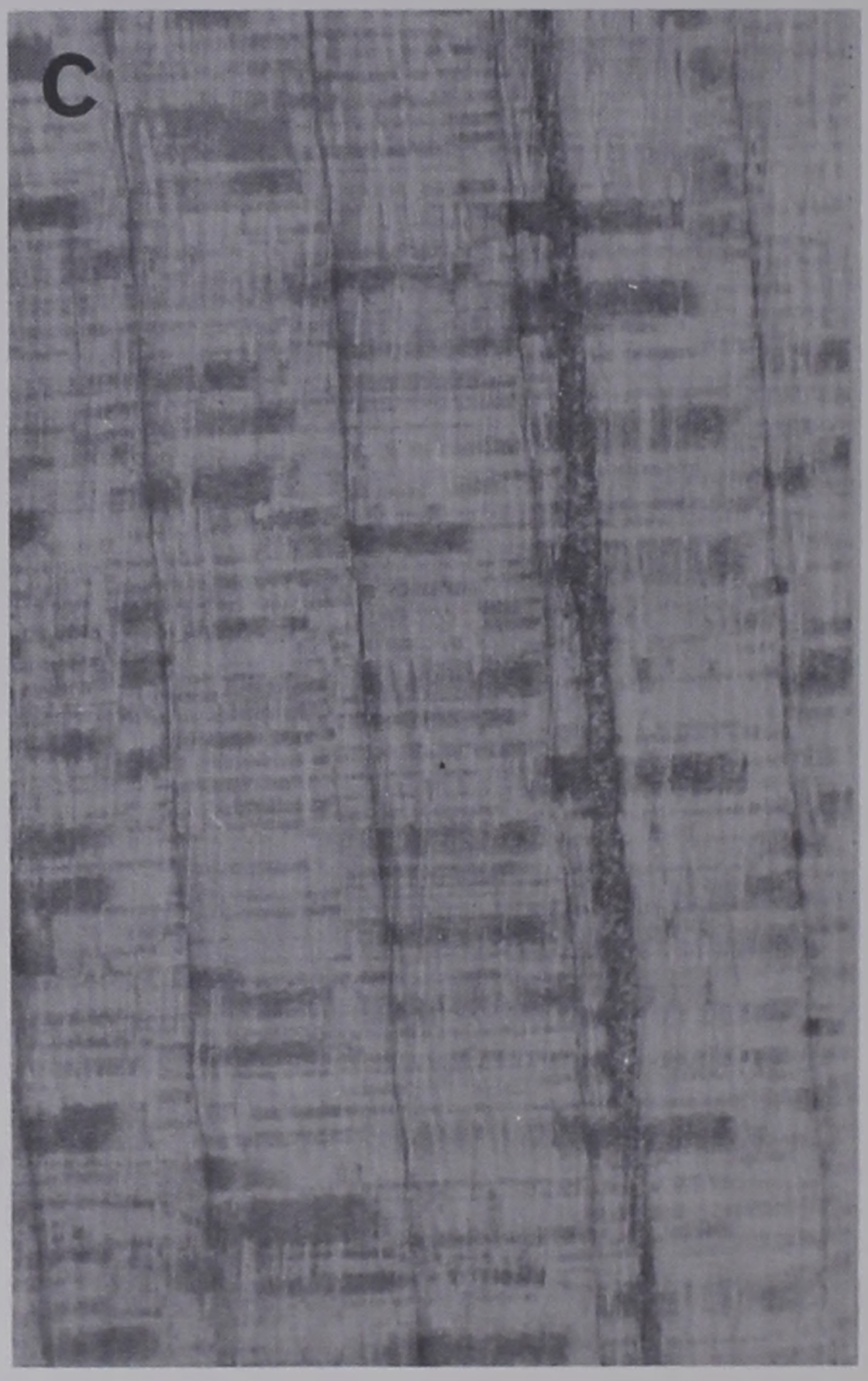


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FIGURE 1. — Example of *Phytobia*-caused pith fleck in sugar maple from northern Wisconsin. (*A*) Cross-section view, enlargement 10X; (*B*) tangential view (rotary cut veneer), enlargement 6X; (*C*) radial view, enlargement 10X.

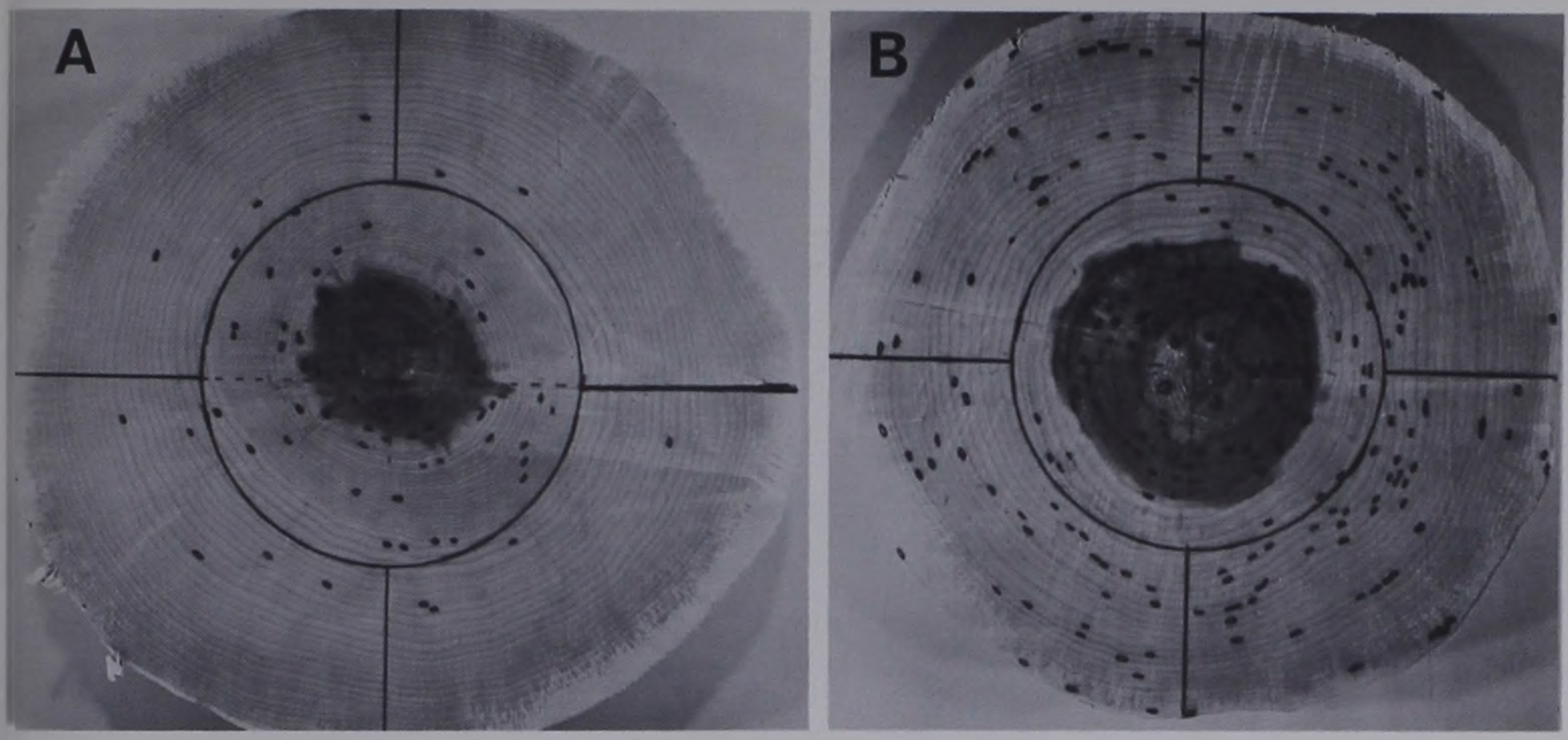

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FIGURE 2. — Sugar maple log ends with pith flecks outlined for illustrative purposes. (*A*) Light pith fleck infestation, 21 per square foot; (*B*) heavy pith fleck infestation, 221 per square foot.

TABLE 1. — *Dollar loss in 1/16-inch veneer cut from pith-fleck-infested No. 1 grade sugar maple logs.*

Log number	Pith flecks per sq. ft.[1/]	Actual value of study yield	Estimated value if no pith flecks present	Monetary loss due to pith flecks	
	Number	Dollars	Dollars	Dollars	Percent
		LIGHT INFESTATION			
1	18	20.88	21.70	0.82	3.8
2	20	25.16	25.40	.24	.9
		MEDIUM INFESTATION			
3	41	22.43	24.48	2.05	8.4
4	68	15.03	15.14	.11	.7
5	84	15.20	16.47	1.27	7.7
		HEAVY INFESTATION			
6	164	19.70	21.77	2.07	9.5
7	190	21.63	25.04	3.41	13.6

[1/] Number of pith flecks per square foot of usable perimeter (outside of a 6½-inch diameter center core) on both end surfaces of the log.

average market price for the top grade. The monetary loss due to pith flecks is the difference between the actual veneer value and estimated values of pith fleck-free veneer (table 1).

Results show that an increasing number of pith flecks on log ends generally indicate an increasing loss in the value of the veneer produced. Exceptions occur (log 4) when pith flecks are restricted to one quarter of the log or clustered around the inner diameter of the usable log perimeter. This suggests that some qualification for area distribution must be employed when grading logs for pith fleck.

The high dollar losses from pith flecks are consistent enough during actual veneer production to warrant special log-grading considerations. A preliminary study of the influence of cambium-mining *Phytobia* larvae on the general quality of sugar maple timber has been concluded. Investigations of insect behavior currently underway may help explain the distribution of pith flecks. Further investigation is needed to develop specifications for grading veneer logs.

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(See reverse for Fig. 3)

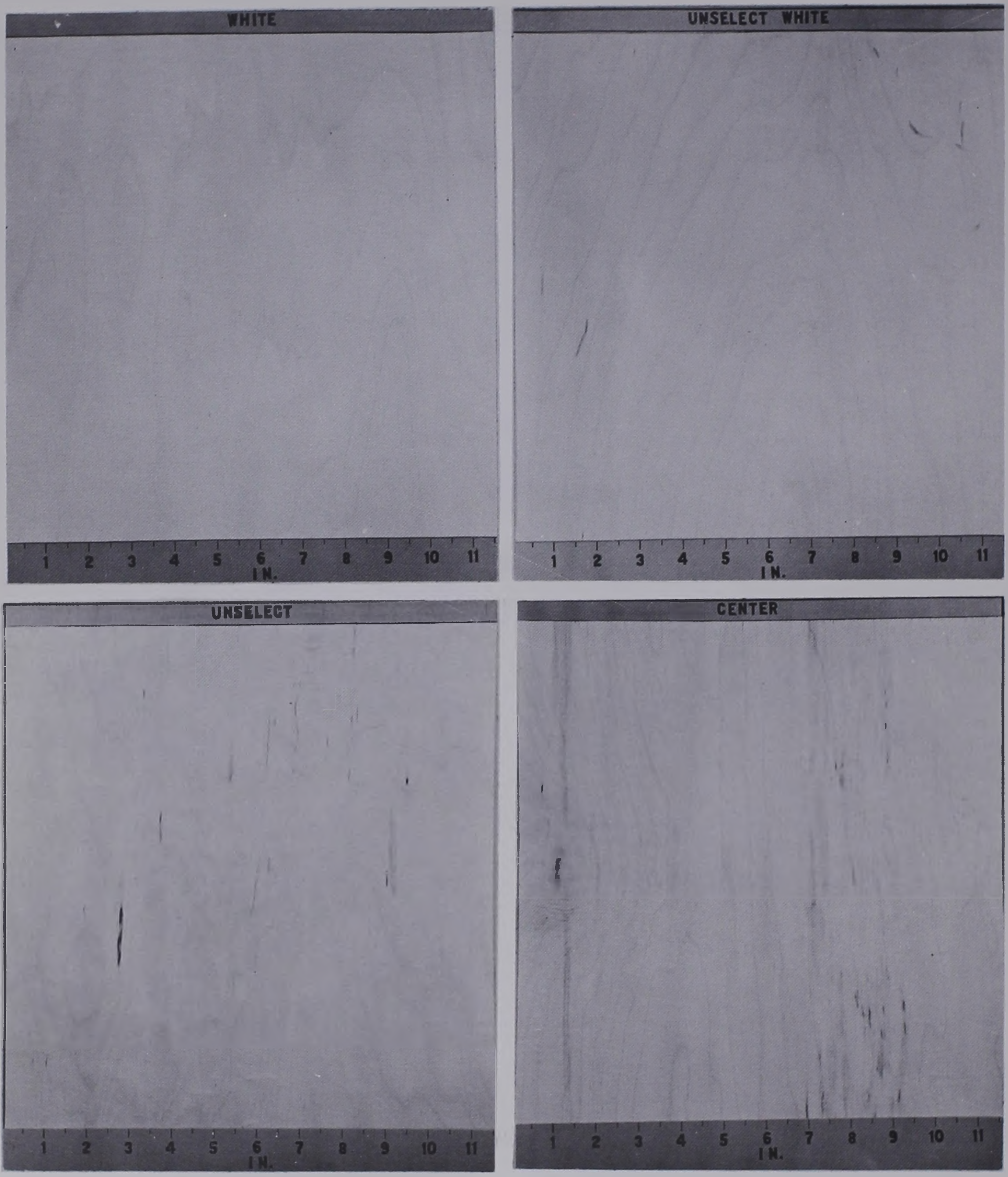

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FIGURE 3. — Examples of the four best veneer grades used in this study.